

The JPL Annual Invention Challenge is ready for its ninth year. The title for this year's contest is the **Launch a Tennis Ball Contest**. The objective and rules are listed below. Questions related to this contest should be directed to: Paul MacNeal at: work phone (818)354-7824, FAX (818)393-5239, M/S 301-486, located in Building 301-475SS, or e-mail to paul.d.macneal@jpl.nasa.gov. Completed entry forms should be directed to Public Services at FAX (818)393-4641, or sent via email to Margaret.R.Porter@jpl.nasa.gov.

OBJECTIVE: Create a device that accurately and quickly launches twenty officially supplied tennis balls into a metal trash can located five meters away from the device in less than 60 seconds. The winner of the contest will be the person whose device gets the most tennis balls into the trash can in the allotted time. In the event of a tie on ball count, the person whose device completed the task in a faster time will receive the higher of the awards.

Rules:

ELIGIBILITY

- 1) The contest is open to all JPL employees, contractors, and immediate family members. JPL family members and friends are welcome to watch the contest, but must be cleared through the security office prior to arrival. JPL employees must fill out the visitor request form as found in the link... <http://eis/international/visitrequest.html>. The contest is also open to teams of students from Southern California middle schools and high schools.

REGISTRATION – JPL PERSONNEL

- 2) Applications for JPL employees, contractors, and immediate family members entering the contest must be filled out and submitted to Public Services prior to midnight November 24, 2006. Completed entry forms should be directed to Public Services at FAX (818)393-4641, or sent via email to Margaret.R.Porter@jpl.nasa.gov. An entry form is included at the end of the rules. All entries will be time stamped based upon the time received. Only the first 20 JPL/contractor entries will be permitted to compete. Five alternates will be accepted in case some entries withdraw prior to the competition.

REGISTRATION – SCHOOLS

- 3) Applications for school teams must be filled out and submitted to Public Services no earlier than September 11, 2006 and no later than midnight October 6, 2006. Completed entry forms should be directed to Public Services at FAX (818)393-4641, or sent via email to Margaret.R.Porter@jpl.nasa.gov. An application form is included at the end of the rules. All entries will be time stamped based upon the time received. Student teams will be notified to verify their acceptance into the contest by October 11, 2006. Questions regarding the entry forms can be directed to Public Services (818)354-0112. Each school is allowed no more than three teams. Internal school competitions are encouraged to select the top three teams if necessary.

Any foreign student (18 or over) or adult will need a special form filled out, which is processed by the Public Services Office. The process takes nearly three weeks, therefore, if you plan on attending the contest at JPL, and you are a foreign national, it is important that you contact Public Services as soon as possible.

All students that attend the JPL contest will be required to have their parent or guardian sign an “Authorization and Release for Photos and/or Video Recording” agreement form prior to their arrival at JPL. This form will be sent out prior to the regional competitions (see Rule 4 below) and must be completed in full and returned to the Public Service office by the November 27, 2006 deadline to allow for processing.

Additions or corrections to the registration forms and/or photo release forms need to be submitted to the Public Services Office no later than Monday, November 27, 2006.

SPECIAL RULES FOR SCHOOL TEAMS

- 4) Only the first 75 student team entries will be permitted to compete at the regional competitions. Student teams will compete at a regional competition held on Saturday, November 18, 2006 at California State University at Fullerton and one additional site near Los Angeles (TBD). Details for the regional competitions will be sent to all registered teams. The top five winners of each regional competition will be invited to compete at the JPL contest held on Friday, December 1, 2006 (see Rule 5 below). In addition, the next closest ten entries between both regional competitions will be invited to compete at the JPL contest.

LOGISTICS

- 5) The contest date and time is Friday, December 1, 2006 between 11:30 AM and 1:00 PM. The contest is held at the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. The contest area is located north of the fountain area, in front of the Administration Building (Bldg. 180) steps. The contest will be held rain or shine. Check-in for the event will begin at 10:15 AM.

DEVICE RULES

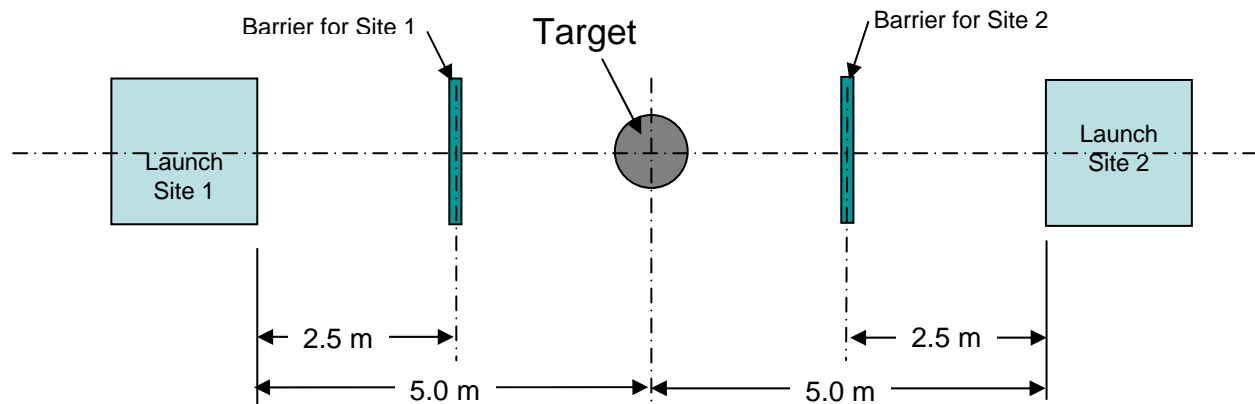
- 6) The device must have the following characteristics:
 - a) Be capable of launching up to twenty (20) officially supplied “used” tennis balls of varying age, mass, and appearance. Some have almost no “fuzz” whereas others are nearly new. The tennis balls are approximately 7 cm [2.75 inches] spherical diameter and have a mass of 60 +/- 5 grams [2.1 ounces]. Absolutely no alterations to the tennis balls are allowed (i.e. no glue, no tape, no freezing, etc.). Once a ball has been launched, and has left the launch site area, it can not be relaunched.



- b) Be capable of accurately launching the tennis ball(s) in one or more launches such that the tennis balls pass over a barrier on their way to the target (see Rule 7).
- c) Be initiated by a single operation (cut a string, flick a switch, pull a pin, etc) provided by the contestant for each launch. No human power may be used to add dynamic or potential energy to launch the tennis ball(s). The device may be moved by human contact once all the tennis balls that were previously launched have touched the ground. The energy source may be reset by human contact to its starting position.
- d) Be physically no wider than 1.50 meters [59 inches], or longer than 1.50 meters [59 inches], or taller than 1.50 meters [59 inches]. These dimensions are strictly enforced throughout the entire time that the device is operating (just before, during, and just after the operation of the device). Anything that is not the tennis ball is considered to be part of the device. Violation of this rule is grounds for disqualification.
- e) Be able to adapt to uneven ground. See Rule 7 for details of the Contest Site.
- f) Not use any remote control devices.
- g) Not be a modified commercially available launching device such as a tennis ball launcher or baseball pitching machine.
- h) Be capable of allowing the officially supplied tennis ball(s) to be installed just before the start of each launch.
- i) There are no weight restrictions.
- j) All construction materials are acceptable, except that no explosives, caustic chemicals, or other materials that might cause personal injury are allowed.
- k) Utilize safe energy sources. Examples of unsafe energy sources are chemical explosions and high pressure gas systems. Questionable sources must be cleared through Paul MacNeal and the Safety Coordinator prior to launching. Electrical power from a standard 120 V source (15 amps maximum) is allowed. The electrical cord may extend beyond the size as specified in Rule 6d.

CONTEST FACILITY DESCRIPTION

- 7) The contest site is outdoors in front of Building 180. The ground is made from concrete and has a slight slope. Two launch sites will be utilized. The contestant will be randomly assigned to either Site 1 or Site 2. The launch site will clearly mark a 1.5 meter by 1.5 meter area on the ground (with tape) to identify the “bounds” of the device. The center of the target is located exactly 5.0 meters [16 feet, 5 inches] from the front edge of the launch site. A barrier that is 1.5 meters [59 inches] tall and 1.5 meters [59 inches] wide is located 2.5 meters [8 feet, 2 inches] from the front edge of the launch site. The barrier will be mostly transparent to allow for visual contact with the trash can. The barrier can be removed during set up at the request of the contestant.



Not to Scale

TARGET DESCRIPTION

- 8) The target is a 30 gallon galvanized steel trash can (Manufacturer is Noll, purchased from Orchard Supply Hardware, \$15). It is 68.5 cm [27 inches] tall and will be placed on the concrete ground. The top rim will be slightly non-level due to the slope of the contest site. The top rim inner diameter is 50.8 cm [20 inches]. The bottom inner diameter is 45 cm [17.7 inches]. There is nothing inside the trash can. The trash can will be secured to the ground using duct tape.



SCORING

- 9) Tennis balls that remain inside the trash can will be counted (1 per ball) except as noted below:
- If the device is moved (relocated) during the flight of any ball(s), a five ball-count penalty will be assessed for each violation. Judge's decision is final in this matter.
 - If any ball fails to pass over the barrier, it will be disallowed. Judge's decision is final in this matter.
 - If any ball passes through the top rim of the trash can after the 60 second time period has been announced, it will be disallowed. Judge's decision is final in this matter.
 - Any ball deemed as "not officially supplied" will be disallowed. Judge's decision is final in this matter and may lead to disqualification.

CONTEST PROCEDURE

- 10) The order in which teams will participate is selected by a random process. The contestant will be given a five-minute period of time to set-up, select the tennis balls, operate their device, and remove the device from the contest site. Strict time limits will be imposed to ensure that all contestants are able to operate their device. There are up to 50 balls to choose from. The contestant will choose the twenty balls for launching during the set-up period. Participants are not allowed to launch any objects during the set-up period.

The official starter will give a countdown (3....2....1....GO!) for the start of operation of the device. Timers will start the time at the starter's direction. The timers will stop the watch at the direction of the official starter. The official starter will voice an audible "STOP!" when the final tennis ball has touched the ground or completely entered the target, or when a total of 60 seconds has transpired (whichever comes first).

The contestant has the right to ask that time be stopped, at which point the official starter will announce an audible STOP and no further attempts of launching will be allowed.

After the balls have been launched, the contestant will then be asked to quickly remove their device from the contest site and place their entry in an area designated by contest officials for further judging.

OFFICIAL SCORING PROCEDURES

- 11) The time will be averaged by two or more official timers. The official time will be recorded to the nearest 0.01 seconds. The official counter will count the balls that remain inside the target. The official counter will ask the field judge if any of the balls should be disallowed. Once there is an agreement on the official number of balls that should be allowed, the official number is recorded on the entry form. The ball count and time will be recorded by the recording secretary.

If there is a tie on the ball count, the tie breaker is based on the time to complete the run. The higher award would go to the owner of the device that completed the run in the fastest time. Any time measurement that is within 0.05 seconds of each other is considered a tie.

AWARDS

- 12) Trophies will be divided into two categories: JPL employees/family/contractor entries and school team entries. Trophies for highest ball count total will be given for first, second, and third place for each category at all contests (regional contests and the JPL contest). In case of a tie as defined in Rule 11, equal trophies will be awarded. Certificates will be issued for the lightest, heaviest, smallest, largest, most unusual, most artistic, and most creative designs.

JPL EMPLOYEE, CONTRACTOR OR FAMILY MEMBER ENTRY FORM FOR 2006
INVENTION CHALLENGE

ENTRY NUMBER _____

Date Received: _____ Time received: _____

Name(s): _____

M/S: _____

Phone: (____) _____

E-mail Address: _____

Title of Entry (be creative): _____

Put entry number somewhere on the device (6 inches or larger in height)

= = = = =
FOR OFFICIAL USE ONLY

Weight: _____ pounds

Length: _____ inches, Width: _____ inches, and Height: _____ inches

Time for operation: _____ seconds

Official number of tennis balls: _____

Creativity score (10 max): _____

Artistic score (10 max): _____

Unusualness score (10 max): _____

Comments:

SCHOOL ENTRY FORM FOR JPL 2006 INVENTION CHALLENGE

ENTRY NUMBER _____

Date Received: _____ Time received: _____

School Name: _____

Single Point of Contact Information:

Name: _____

Phone: () _____

Email Address: _____

School Address: _____
Street City Zip Code

Team Name: _____ Entry Name: _____

Put entry number somewhere on the device (6 inches or larger in height)

Team Member Names and Ages (if over 18, state Citizenship):

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

Chaperone/Teacher Names and Citizenship (mandatory)

1) _____

2) _____

Note: All students that participate at JPL will need to have their parent or guardian sign an Authorization and Release for Photos and/or Video Recording Photography Release Form! Details sent after registration is over.

Teacher/Educator Advisor: _____

Phone of Advisor: _____

SCHOOL NAME _____ ENTRY NUMBER _____

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FOR OFFICIAL USE ONLY

Weight: _____ pounds

Length: _____ inches, Width: _____ inches, and Height: _____ inches

Time for operation: _____ seconds

Official number of tennis balls: _____

Creativity score (10 max): _____

Artistic score (10 max): _____

Unusualness score (10 max): _____

Comments: